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JEL classification: F23, O34

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FDI Inflows and Outflows, Intellectual Property Rights, and Productivity Growth

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Abstract: Using panel data of 57 countries during the period of 1995-2012, this study investigates the impact of intellectual property rights (IPR) processes on productivity growth. The IPR processes are decomposed into three stages, innovation process, commercialization process, and IPR protection process. Our results suggest that better IPR protection is directly associated with productivity improvement only in developed economies. In addition, the contribution of IPR processes on growth through foreign direct investment (FDI) appears to be very limited. Only FDI inflows in developed countries which help to create a better innovative capability lead to a higher growth. And in connection with FDI outflows, only IPR protection and commercialization processes are proven to improve productivity in the case of developing countries, particularly when the country acts as the investing country.

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1. Introduction

FDI has been a critical component for the economic development process in most developing economies. Fundamentally it points to the fact that FDI would not only develop and utilise idle resources, but also use all the available resources more

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efficiently. Contributions by FDI to the growth of national output and economic efficiency improvement have been the focal points of previous and recent studies to reassure that FDI is a viable choice for the FDI-host country. In an attempt to provide some empirical illustration, growth in national output led by FDI has been a popular measurement choice and encouraging evidence to support FDI pursuing policies that is widely used by the host countries, especially those that offer FDI incentives.

It has been widely argued that FDI is complementary to growth in the host countries. Influx of FDI is empirically illustrated as a major factor supporting job creation and efficiency improvement in the host economies. Providing the supply of essential capital needed for economic development is perhaps just another primary role of FDI, as many countries also look for greater economic benefits in terms of technology transfer; i.e., the so called "Spillover effect", to help them move up the value chain. Such positive external aspects bring many factors into consideration about whether FDI can live up to its expectations. In this connection, IPR protection has received a great deal of attention. It was argued, to some extent, that the positive contribution of FDI on growth is even in doubt depending on the stage of IPR development. Generally, the arguments on the role of IPR on productivity enhancement led by FDI are twofold. A direct channel explains that a tightening of IPR would create a better investment environment for a technology-intensive or knowledge-intensive sector so that, through a suitable technology transfer mechanism, it helps accelerate output growth. In one sense, this implies a greater vertical FDI type, which means FDI for different products in the host country from those produced in the home country. The other possibility involves simply changing the IPR regulations to attract greater FDI inflows. An increase of FDI in a host country creates more opportunities for economies of scale. Moreover, an increase in FDI also encourages a more efficient allocation and utilisation of resources, thus a higher output growth potential.

This paper aims to focus on the contribution of FDI to improving competitiveness by the host country through improving productivity. In addition, we are also interested in identifying some of the crucial intellectual property right (IPR) aspects together with both inward and outward FDI that help to promote long-run competitiveness and ensure a better and sustainable economic development in the future. Furthermore, we are

also interested to investigate how the interaction between FDI (inward and outward) and IPR may impact productivity growth. For instance, is it true to say that the greater innovation capability of a country will attract more FDI and thus, promote growth in output? Or, considering the case of outward FDI, does investing in a country with better innovative capability lead to productivity improvement in the FDI's home economy? If that is the case, the destination of outward FDI ought to be concentrated more toward highly technologically advanced economies.

While most of the previous studies concentrated mainly on IPR protection, the contribution of the role of intellectual property rights (IPR) in this study considers the differences in the IPR process consisting of the 1) Innovation process, 2) Commercialisation process, and 3) IPR protection process. In each of these processes it is hypothesized that there will be a different impact on productivity enhancement through FDI inflows and outflows. Ambiguous effects have been discovered in earlier studies. Kashcheeva (2013), for instance, reported that, while positive impacts of IPR on productivity improvement in the host economy are confirmed, providing a stricter IPR environment in the host country does not guarantee productivity enhancement via FDI. In fact, it was pointed out that the level of FDI in the host economy was proved to be essential. A general equilibrium analysis has indicated a possibility that a stricter IPR might have an adverse effect on output growth and certainly on the rate of growth.

In this study, three variables are applied to illustrate the impact of each of the IPR processes on the host and home country's productivity growth in terms of the stock of inward and outward FDI respectively. Firstly, the number of patents per resident is used to represent the degree of innovation capability of the host country as the first stage of the IPR process. A country with a greater IPR innovation capability is considered to be a so called "IPR producer", with a positive impact on output growth expected, and an increase in the number of innovations should be positive, or at least not harmful, for economic growth. However, there is also the possibility of a diminishing factor as more innovations are introduced. The marginal benefit obtained from innovation activities in terms of output growth may decrease as the earlier innovations appear to achieve a greater leap in value creation.

Secondly, the degree to which innovations translate into greater production in the economy (and also economic value added) and the IPR commercialisation process is represented by the ease of (or the amount of activities) knowledge transfer between universities and the private sector. Better links between the two entities indicate successful communication and a healthy IPR development that is expected to promote productivity growth.

Finally, the protection process is the stage of IPR development widely considered in literature as the key element that is essential to improve a nation's competitiveness in the long-run. Basically, it is argued that a stricter protection scheme supports the growth in output. However, the empirical evidence has not shown solid support for this argument. For example, it is argued that for a user of new technology, a tighter IPR protection means that it is more costly to obtain access to advanced and up to date production technology and this makes it more difficult to use existing innovations as a basis for further creative activities.

2. Methodology

This study employs a variation of the Alfaro et al (2009) model that was originally used to examine the role of FDI on growth in financial markets. The model is modified in a way that can capture the effects of the intellectual property rights process on TFP growth via two main channels. Firstly, the intellectual property rights may have a direct relationship with TFP growth, as IPR development on its own is a productivity enhancement activity. Greater innovation achievements, smoother transfer of knowledge (or better links between IPR producers and IPR users), and a tighter IPR protection scheme, are expected to improve national output growth. Some even have high hopes for IPR development as a mechanism essential for developing economies to pull themselves out of the "Middle income trap", by building up more economic value added activities and moving up the global value chain.

For the second channel, IPR may have an indirect effect on growth through interaction with FDI that affects the relationship between FDI and growth. This perhaps rests on the fact that a more suitable IPR environment might be able to attract more FDI

flows, both inward and outward. As a result, this may lead to a higher growth rate of output by realizing the benefits of economies of scale and more efficient utilization of production resources. In addition, with a better IPR environment, perhaps the types of FDI that is attracted may generate higher economic value added and greater positive FDI spillover, which will help improve the country's competitiveness and stimulate economic growth.

Hence, the model presented in this paper has TFP growth as a dependent variable, and the variables of interest included are the intellectual property rights (IPR) policy variables and their corresponding interaction terms with *FDI* , as regressors. In particular, it is presented in the following form:

$$TFPgrowth_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 FDI_{it} + \beta_3 \overset{(?)}{Policy}_{it} + \beta_4 FDI_{it} * \overset{(?)}{Policy}_{it} + \varepsilon_{it}$$

where *i* represents a country and *t* is a time period. β s are the estimated coefficients; and ε_{it} is the error term.

The *TFPgrowth* variable corresponds to the growth rate of TFP. *X* is the set of control variables including the share of the non-agricultural sector as a percentage of GDP (*NonAgri*), level of development, measured by real GDP per capita (*GDPPC*), size of population (in millions) (*POP*), domestic credit in the private sector as a percentage of GDP (*Credit*), inflation rate (*Inflation*), share of government consumption as a percentage of GDP (*GOV*), trade openness measured by the sum of export and import as a percentage of GDP (*Openness*), and the local institutional quality in which the rule of law index (*RuleofLaw*) is used as a proxy.

FDI is the FDI stock as a percentage of GDP. Both FDI inflows and outflows are investigated since they may have different effects on productivity growth. In terms of the relationship between FDI and productivity growth, the existing empirical literature found ambiguous results. The positive effect of FDI on growth is conditional on local conditions and policies (such as, the policy environment, human capital, local financial markets, market strictness, etc.)[1]. For instance, Lipsey (2002) came to the conclusion that there is no confirmed correlation between FDI (stocks or flows) and output growth. A

[1] For recent literature review on the relationship between FDI and productivity, see Alfaro et al (2009), Moran (2007).

"micro-level" analysis was conducted by Görg and Greenaway (2004) that found a negative impact from the FDI spillover effect. Besides, Aitken and Harrison (1999) argued that there can be a negative effect of FDI on the productivity of domestically owned plants due to the competition effect occasioned by the entry of MNEs.

To investigate the impact of IPR on productivity enhancement, a set of IPR related variables is introduced, such that the role of each IPR process in stimulating production growth in an economy can be monitored. The three IPR related indicators are: 1) Intellectual property rights (*IPR*) (as a proxy of the IPR protection process), 2) The number of patents granted to residents (*PATENT*) (as a proxy of the IPR innovation process), and 3) Knowledge transfer (*KTRANSER*) (as a proxy of the IPR commercialization process). All are drawn from the IMD's World Competitiveness Yearbook 2013. The *IPR* and *KTRANSER* indicators are based on the executive opinion survey response to the survey questions, "Are intellectual property rights adequately enforced?" and "Is knowledge transfer highly developed between companies and universities?". As stated, the existing empirical findings on the relationship between IPR and productivity growth are not entirely unambiguous. Hence, it is the focus of this study to explore this relationship for both the direct and indirect channels (through the interaction with FDI).

3. Data and Empirical Issues

Since unbalanced panel data from 57 countries during the period of 1995-2012 is used, the Hausman (1978) specification test was employed to test whether a fixed effect or random effect model specification is more appropriate. The result from the Hausman test rejected the null hypothesis, in which the estimated coefficients between the two estimators were statistically indifferent, and suggested the fixed-effect model estimator. In order to control both the potential serial correlation and heteroskedasticity problems, a fixed effect model with a robust covariance matrix is selected as the main estimator. In addition, since estimation results for developed and developing countries could vary substantially, the TFP growth model is estimated for both developed- and developing-country datasets for the purpose of comparative analysis.

In summary, this study estimates the TFP growth model by using a fixed effect model with a robust covariance matrix estimator and with three datasets: the "all-country", "developing-country", and "developed-country" datasets[2]. The estimation results are reported in Tables 1 to 6. Tables 1 to 3 focus on the effects of FDI inflows; whereas, the effects of FDI outflows are shown in Tables 4 to 6. Column (1) in all the tables is the basic specification (with no IPR indicators). In columns (2), (4), and (6), the IPR indicators are added in the set of regressors with no interaction term. Finally, the IPR indicators with the interaction term (for the FDI and IPR indicators) are presented in columns (3), (5), and (7). The estimation results are discussed and presented in the section below.

4. Empirical Findings

For the set of control variables, the basic estimation results (column 1 in Tables 1 to 6) show that the share of the non-agricultural sector, level of development, domestic credit, inflation, government consumption, and trade openness have some impact on TFP growth. While trade openness appears to have a robust positive impact, the coefficient of inflation is negative and significant, suggesting that a higher inflation rate would result in a lower TFP growth rate. For the share of the non-agricultural sector, level of development, domestic credit, and government consumption, the estimated coefficients, although, are significant in some regressions, but they are not robustly significant depending upon the country's dataset in use and/or the choice of explanatory variables (FDI inflows or outflows) included in the model. Finally, the population size and local institutional quality are found to be insignificant.

4.1 Effects of FDI Inflows

Based on the estimation results in Tables 1 to 3, FDI inflows turn out to have a negative effect on TFP growth. This finding may reflect a concave relationship. As FDI inflows increase, the productivity gains (or improvements) from FDI diminish. The finding once again suggests that the benefits obtained by the host country in terms of

[2] The list of 57 countries and data sources for all variables is reported in Appendix A.

output growth depend on the level of FDI inflows. An inward FDI flow in the early stage appears to have a larger positive impact on growth. As the level of FDI flow into the host country increases, the marginal benefit tends to reduce. However, this negative relationship is not robust and significant in all regressions (except when the developing countries' dataset was used). This non-robust relationship between FDI inflows and growth corresponds with the findings from Alfaro et al (2009) and Lipsey (2002), in which the relationship is ambiguous depending on the influence of other factors, such as the level of human capital (Borensztein et al, 1998) and the development of the domestic financial market (Alfaro et al, 2009). In this study, the focus is on the role of the IPR process, especially the role of inward and outward FDI flows on productivity growth.

When the IPR policy indicators are added without the interaction term (columns (2), (4), and (6)), the IPR and knowledge transfer appear to have a positive and significant effect on TFP growth according to the all-country dataset, but only the effects of the IPR indicator remain significant according to the developed-country dataset. This finding indicates that providing more IPR protection for investors can significantly induce growth in developed countries. This is perhaps because better IPR protection creates more suitable conditions for technological transfer and technology development that would enhance growth. Developed economies are considered to have a higher innovative capability, in which investment may be used to finance high technology activities. Hence, the relationship between IPR protection and growth appears stronger in developed countries.

On the contrary, all IPR policy indicators seem to have no significant impact on TFP growth in developing countries. As an IPR user, not a main producer, developing countries tend to have less incentive to provide IPR protection. Although improving IPR protection helps increase the value of input used in a country imposing stricter IPR protection as it enhances technology transfer, it may increase the cost of accessing or utilizing such updated innovative knowledge.

Next, after the inclusion of the interaction terms of the FDI and IPR policy indicators, only the interaction of FDI inflows with the number of patent indicators is significant and positive at 10 per cent in the all-country and developed country datasets. This suggests that a developed country with a higher number of patents granted is in a

better position to seize the benefits from FDI promoting productivity growth. Hence, a higher number of patents can lead to a positive FDI spillover in developed countries. However, none of the interaction terms appear significant in developing countries.

4.2 Effects of FDI Outflows

Column 1 in Tables 4 to 6 illustrates that the estimated coefficient of FDI outflows is significant and negative. Even after the IPR policy indicators (without interaction term) are added (columns 2, 4, and 6) the negative and significant coefficient of FDI outflows remains robust in most regressions (except column (4) in Table 6). This finding strengthens the view for the concave relationship between FDI and growth. For the coefficient on the IPR policy indicators, only the IPR indicator (column 2) is shown to have a positive and significant effect on TFP growth in the all-country and developed-country datasets. This finding indicates the important role of IPR protection for productivity growth in developed countries.

When considering the interaction of FDI outflows with IPR policy indicators (Columns 3, 5, 7), these interactions appear to have no significant impact on TFP growth according to the developed-country dataset. On the contrary, the interaction of FDI outflows with the IPR and knowledge transfer indicators have a significant positive effect on growth when the dataset of the developing countries is employed. It suggests that better levels of IPR protection and knowledge transfer between companies and universities benefit developing countries through positive FDI spillover enhancing productivity growth.

5. Concluding Remarks

The study found a reverse relationship for both inward and outward FDI flows on productivity improvement. An increase in FDI inflows and outflows has a negative effect on the rate of productivity growth, which suggests a concave relationship; i.e., the possibility of a diminishing return of scale for production growth created by FDI.

A Summary of the Effect of the IPR Process on Productivity Growth

Stage of Economic Development	IPR Process		
	Innovation	Commercialization	Protection
Developed Economy	X	X	(+)
Developing Economy	X	X	X

Note: X = There is no significant effect on growth; (+) = Indicates a robust positive impact of IPR on growth.

Better IPR protection contributes positively to productivity improvement in developed economies. Whereas, innovative capability and knowledge transfer are found to have some impact on growth, but the relationships are not robustly significant. The effects of all three IPR processes directly affecting growth are rated weak and ambiguous in developing countries. The results suggest that improving the IPR protection environment in a developing country does not guarantee greater productivity growth, as the increasing cost of accessing the available technology and know-how eliminates the positive gains from protection. The IPR commercialization process and innovation capability also have a limiting effect on output growth in developing economies. This raises the question about the effectiveness of how innovation can be translated into marketable products and how developing economies should conduct their IPR related policies. In addition, innovation has not been proven to be beneficial for productivity enhancement, which could be linked to the fact that most developing nations have not been able to generate new technology consistent with the comparative advantages. More convincing evidence is seen for developed economies where IPR protection activities are shown to stimulate growth.

A Summary of the Effect of the IPR Process on Productivity Growth through FDI

Stage of Economic Development	IPR Process through FDI inflows		
	Innovation	Commercialization	Protection
Developed Economy	(+)	X	X
Developing Economy	X	X	X

Stage of Economic Development	IPR Process through FDI outflows		
	Innovation	Commercialization	Protection
Developed Economy	X	X	X
Developing Economy	X	(+)	(+)

Note: X = There is no significant effect on growth; (+) = Indicates a robust positive impact of IPR on growth.

The contribution of IPR processes on growth through FDI flows appears rather ambiguous as the benefits seem to be associated more with firms that invest abroad. The possibility of productivity enhancement in the host country through inward FDI is very limited as the results suggest that only the inflow of FDI in developed countries which helping to create a better innovative capability lives up to expectations. In connection with FDI outflows, only IPR protection and IPR commercialization (through FDI outflow) are proven to improve productivity in the case of developing nations, particularly when the country acts as the investing country.

Although having a small impact, the contribution of IPR through inward and outward flows of FDI in developed and developing economies is also shown to be different. Inward FDI in developed economies is more likely to show a vertical FDI and thus lead to improved innovative capability. In developing economies, inward FDI flows tend to be horizontal and there are cases where FDI that brought in production technology that is not consistent with the host country's comparative advantage has led to a less than efficient production in the long-run. Greater inflows of FDI, rather than building innovative capability in the host economies, inherit a so called "buying technology" habit or mentality which, in the long-run, limits the country's greater productivity improvement.

Table 1. Regression results, FDI inflows, all countries, dependent variable: TFP growth

	(1) Basic	(2) *Policy= IPR*	(3) *Policy= IPR*	(4) *Policy= Patent*	(5) *Policy= Patent*	(6) *Policy= KTransfer*	(7) *Policy= KTransfer*
NonAgri	-0.1992	-0.1518	-0.1496	-0.2753	-0.2662	-0.1748	-0.1702
	(0.1089)*	(0.1167)	(0.1157)	(0.1987)	(0.1958)	(0.1156)	(0.1164)
ln*GDPPC*	-1.7667	-0.2526	-0.0220	-3.5427	-3.5704	-0.2476	-0.1855
	(1.7127)	(1.5300)	(1.5916)	(2.1836)	(2.1722)	(1.4862)	(1.5594)
ln*POP*	2.5680	3.1066	2.4593	-1.1413	-1.2542	1.6999	1.5405
	(2.3568)	(3.1241)	(3.0766)	(2.3198)	(2.2824)	(3.0943)	(3.1391)
Credit	-0.0266	-0.0238	-0.0233	-0.0256	-0.0263	-0.0256	-0.0255
	(0.0099)***	(0.0084)***	(0.0084)***	(0.0159)	(0.0160)	(0.0083)***	(0.0083)***
Inflation	-0.1180	-0.1013	-0.1069	-0.2239	-0.2229	-0.0998	-0.1017
	(0.0343)***	(0.0633)	(0.0648)	(0.0684)***	(0.0683)***	(0.0639)	(0.0660)
GOV	-0.1687	-0.2635	-0.2705	-0.3521	-0.3577	-0.2463	-0.2479
	(0.0573)***	(0.0851)***	(0.0831)***	(0.0963)***	(0.0959)***	(0.0795)***	(0.0788)***
Openness	0.0647	0.0545	0.0524	0.0724	0.0729	0.0545	0.0537
	(0.0118)***	(0.0112)***	(0.0115)***	(0.0223)***	(0.0222)***	(0.0114)***	(0.0122)***
RuleofLaw	-0.9144	0.0889	-0.0379	-0.2485	-0.2511	0.3349	0.2418
	(1.0978)	(1.0009)	(0.9826)	(1.6248)	(1.6158)	(1.0133)	(1.0790)
FDIin	-0.0163	-0.0158	-0.0550	-0.0236	-0.0265	-0.0160	-0.0250
	(0.0065)*	(0.0058)***	(0.0576)	(0.0081)***	(0.0091)***	(0.0060)*	(0.0500)
Policy		0.4812	0.3202	0.0000	-0.0000	0.3604	0.3097
		(0.2185)*	(0.3108)	(0.0000)	(0.0000)*	(0.1884)*	(0.2675)
*FDIin*Policy*			0.0055		0.0000		0.0015
			(0.0074)		(0.0000)*		(0.0076)
Constant	29.7331	7.5129	8.6251	67.5114	67.3059	14.9034	14.8422
	(13.3336)*	(10.1405)	(9.3756)	(21.9102)***	(21.8595)***	(9.9966)	(9.9287)
R^2	0.20	0.17	0.18	0.19	0.20	0.17	0.17
Observation	671	608	608	481	481	608	608
No. of countries	57	57	57	57	57	57	57

Notes: Figures in parentheses are robust standard errors. ***, **, * indicate significance levels at 1%, 5%, 10%, respectively.

Table 2. Regression results, FDI inflows, developed countries, dependent variable: TFP growth

	(1) Basic	(2) *Policy= IPR*	(3) *Policy= IPR*	(4) *Policy= Patent*	(5) *Policy= Patent*	(6) *Policy= KTransfer*	(7) *Policy= KTransfer*
NonAgri	-0.0759	0.0405	0.0415	-0.6868	-0.6749	-0.0211	-0.0397
	(0.1868)	(0.1827)	(0.1817)	(0.6958)	(0.6912)	(0.1903)	(0.1903)
ln*GDPPC*	-4.6870	-3.4059	-3.4727	-6.1888	-6.6289	-3.1968	-3.7037
	(2.4071)*	(2.5872)	(2.7118)	(4.6818)	(4.6208)	(2.5209)	(2.7959)
ln*POP*	0.1755	-0.0405	0.2545	-4.0377	-4.1562	-1.1333	-0.1594
	(1.2686)	(2.8120)	(3.1733)	(1.9045)*	(1.9285)*	(2.9705)	(3.3040)
Credit	-0.0166	-0.0154	-0.0155	-0.0110	-0.0114	-0.0174	-0.0176
	(0.0091)*	(0.0082)*	(0.0082)*	(0.0101)	(0.0102)	(0.0084)*	(0.0086)*
Inflation	-0.1985	-0.1485	-0.1416	-0.3110	-0.3060	-0.1574	-0.1328
	(0.0592)***	(0.0764)*	(0.0709)*	(0.0565)***	(0.0580)***	(0.0797)*	(0.0772)*
GOV	-0.1396	-0.2798	-0.2788	-0.5123	-0.5248	-0.2423	-0.2490
	(0.1253)	(0.1320)*	(0.1312)*	(0.1623)***	(0.1616)***	(0.1289)*	(0.1327)*
Openness	0.0697	0.0655	0.0661	0.0642	0.0653	0.0650	0.0689
	(0.0145)***	(0.0148)***	(0.0155)***	(0.0290)*	(0.0289)*	(0.0150)***	(0.0171)***
RuleofLaw	-0.3556	-0.1960	-0.1861	0.0015	0.0782	0.2226	0.6834
	(1.7157)	(1.6733)	(1.6670)	(2.4964)	(2.4900)	(1.6811)	(1.6507)
FDIin	-0.0115	-0.0125	-0.0022	-0.0159	-0.0185	-0.0122	0.0236
	(0.0048)*	(0.0045)***	(0.0443)	(0.0056)***	(0.0068)*	(0.0047)*	(0.0357)
Policy		0.6559	0.7094	0.0000	-0.0000	0.2881	0.5031
		(0.2336)***	(0.3264)*	(0.0000)	(0.0000)	(0.1858)	(0.2776)*
*FDIin*Policy*			-0.0014		0.0000		-0.0059
			(0.0061)		(0.0000)*		(0.0060)
Constant	53.5260	27.8707	27.2430	145.2400	148.7843	36.5843	38.8450
	(26.7213)*	(26.9476)	(26.2563)	(66.5196)*	(65.7850)*	(27.1287)	(28.9745)
R^2	0.17	0.18	0.18	0.19	0.19	0.17	0.17
Observation	437	410	410	312	312	410	410
No. of countries	-0.0759	0.0405	0.0415	-0.6868	-0.6749	-0.0211	-0.0397

Notes: Figures in parentheses are robust standard errors. ***, **, * indicate significance levels at 1%, 5%, 10%, respectively.

Table 3. Regression results, FDI inflows, developing countries, dependent variable: TFP growth

	(1) Basic	(2) *Policy*= *IPR*	(3) *Policy*= *IPR*	(4) *Policy*= *Patent*	(5) *Policy*= *Patent*	(6) *Policy*= *KTransfer*	(7) *Policy*= *KTransfer*
NonAgri	-0.0760	-0.1688	-0.1700	-0.0244	-0.0146	-0.1644	-0.1069
	(0.0930)	(0.1052)	(0.1073)	(0.1412)	(0.1392)	(0.1018)	(0.1100)
ln*GDPPC*	-0.0039	2.2555	2.0875	-1.4239	-2.2419	2.2002	1.4959
	(2.1196)	(2.7594)	(2.9326)	(4.4319)	(3.7980)	(3.0844)	(3.1685)
ln*POP*	3.2605	3.7750	5.6523	7.9370	9.4222	4.3526	6.6509
	(5.4442)	(6.4311)	(6.2753)	(8.1581)	(7.9548)	(7.4388)	(6.7837)
Credit	-0.1051	-0.0853	-0.0861	-0.1024	-0.0992	-0.0896	-0.0856
	(0.0274)***	(0.0255)***	(0.0235)***	(0.0339)***	(0.0319)***	(0.0244)***	(0.0242)***
Inflation	-0.1052	-0.1067	-0.1055	-0.1968	-0.2001	-0.1075	-0.1149
	(0.0358)***	(0.0638)	(0.0593)*	(0.0929)*	(0.0986)*	(0.0654)	(0.0630)*
GOV	-0.2847	-0.3327	-0.3105	-0.4260	-0.4257	-0.3211	-0.3428
	(0.0595)***	(0.1041)***	(0.0906)***	(0.0779)***	(0.0803)***	(0.0949)***	(0.0942)***
Openness	0.0749	0.0595	0.0558	0.1095	0.1074	0.0635	0.0677
	(0.0255)***	(0.0257)*	(0.0261)*	(0.0306)***	(0.0283)***	(0.0249)*	(0.0244)*
RuleofLaw	1.2843	1.9703	1.8139	0.9589	0.9838	2.4540	2.2783
	(1.4146)	(1.2517)	(1.1491)	(2.0970)	(2.0199)	(1.0145)*	(0.9332)*
FDIin	-0.0515	-0.0962	-0.2462	-0.0648	-0.0574	-0.0883	-0.2149
	(0.0225)*	(0.0354)*	(0.1110)*	(0.0264)*	(0.0217)*	(0.0323)*	(0.1097)*
Policy		0.4110	-0.3354	-0.0000	0.0001	-0.0703	-0.9968
		(0.4324)	(0.6475)	(0.0000)	(0.0002)	(0.4820)	(0.8291)
*FDIin*Policy*			0.0290		-0.0000		0.0304
			(0.0197)		(0.0000)		(0.0254)
Constant	2.3878	-10.1737	-12.9808	-9.2555	-9.5344	-10.7721	-16.3875
	(14.9290)	(13.0249)	(13.3738)	(25.1099)	(24.8619)	(18.4963)	(15.1561)
R^2	0.36	0.31	0.33	0.32	0.32	0.30	0.32
Observation	234	198	198	169	169	198	198
No. of countries	20	20	20	20	20	20	20

Notes: Figures in parentheses are robust standard errors. ***, **, * indicate significance levels at 1%, 5%, 10%, respectively.

Table 4. Regression results, FDI outflows, all countries, dependent variable: TFP growth

	(1) Basic	(2) *Policy= IPR*	(3) *Policy= IPR*	(4) *Policy= Patent*	(5) *Policy= Patent*	(6) *Policy= KTransfer*	(7) *Policy= KTransfer*
NonAgri	-0.2143	-0.1598	-0.1583	-0.2899	-0.2899	-0.1830	-0.1813
	(0.1178)*	(0.1213)	(0.1217)	(0.2122)	(0.2126)	(0.1206)	(0.1215)
ln*GDPPC*	-1.8953	-0.2797	-0.2406	-4.1593	-4.0771	-0.3132	-0.2954
	(1.7923)	(1.6418)	(1.6729)	(2.3112)*	(2.3226)*	(1.5891)	(1.6132)
ln*POP*	2.4255	2.8743	2.7272	-1.1605	-1.1958	1.5428	1.5248
	(2.3127)	(3.1819)	(3.2626)	(2.4725)	(2.4712)	(3.1660)	(3.1807)
Credit	-0.0255	-0.0219	-0.0219	-0.0213	-0.0214	-0.0236	-0.0236
	(0.0101)*	(0.0084)*	(0.0084)*	(0.0166)	(0.0166)	(0.0084)***	(0.0083)***
Inflation	-0.1129	-0.0969	-0.0977	-0.2188	-0.2188	-0.0957	-0.0963
	(0.0332)***	(0.0613)	(0.0621)	(0.0680)***	(0.0684)***	(0.0625)	(0.0631)
GOV	-0.1529	-0.2625	-0.2639	-0.3542	-0.3578	-0.2450	-0.2454
	(0.0553)***	(0.0859)***	(0.0852)***	(0.1038)***	(0.1046)***	(0.0803)***	(0.0802)***
Openness	0.0566	0.0488	0.0482	0.0710	0.0707	0.0495	0.0493
	(0.0118)***	(0.0122)***	(0.0125)***	(0.0215)***	(0.0216)***	(0.0122)***	(0.0125)***
RuleofLaw	-0.9717	0.2060	0.1962	0.0218	0.0158	0.4617	0.4354
	(1.1201)	(0.9762)	(0.9730)	(1.6774)	(1.6768)	(0.9973)	(1.0092)
FDIout	-0.0089	-0.0109	-0.0219	-0.0194	-0.0201	-0.0118	-0.0158
	(0.0051)*	(0.0051)*	(0.0422)	(0.0060)***	(0.0060)***	(0.0051)*	(0.0386)
Policy		0.4977	0.4672	0.0000	-0.0000	0.3666	0.3481
		(0.2277)*	(0.2609)*	(0.0000)	(0.0000)	(0.1886)*	(0.2339)
*FDIout*Policy*			0.0015		0.0000		0.0007
			(0.0057)		(0.0000)		(0.0060)
Constant	32.8276	9.0454	9.2594	73.8657	73.2997	16.5756	16.4564
	(14.1110)*	(10.4467)	(10.2513)	(23.3737)***	(23.4387)***	(10.1536)	(10.2563)
R^2	0.19	0.17	0.17	0.18	0.18	0.16	0.16
Observation	663	604	604	474	474	604	604
No. of countries	57	57	57	57	57	57	57

Notes: Figures in parentheses are robust standard errors. ***, **, * indicate significance levels at 1%, 5%, 10%, respectively.

Table 5. Regression results, FDI outflows, developed countries, dependent variable: TFP growth

	(1) Basic	(2) *Policy= IPR*	(3) *Policy= IPR*	(4) *Policy= Patent*	(5) *Policy= Patent*	(6) *Policy= KTransfer*	(7) *Policy= KTransfer*
NonAgri	-0.0866	0.0335	0.0310	-0.7065	-0.6847	-0.0278	-0.0324
	(0.1894)	(0.1839)	(0.1855)	(0.7064)	(0.7108)	(0.1919)	(0.1943)
ln*GDPPC*	-5.4560	-4.2113	-4.2368	-7.3172	-7.5928	-4.0118	-4.0680
	(2.4767)*	(2.6208)	(2.6867)	(4.7055)	(4.7519)	(2.5567)	(2.6555)
ln*POP*	0.3383	0.5803	0.7395	-3.8566	-3.8922	-0.4515	-0.3877
	(1.3444)	(2.9371)	(3.1570)	(1.9164)*	(1.9162)*	(3.0147)	(3.0923)
Credit	-0.0129	-0.0114	-0.0114	-0.0052	-0.0051	-0.0134	-0.0135
	(0.0091)	(0.0082)	(0.0083)	(0.0096)	(0.0096)	(0.0083)	(0.0084)
Inflation	-0.2019	-0.1571	-0.1536	-0.3131	-0.3102	-0.1663	-0.1627
	(0.0619)***	(0.0815)*	(0.0762)*	(0.0530)***	(0.0543)***	(0.0848)*	(0.0806)*
GOV	-0.1448	-0.2909	-0.2903	-0.5261	-0.5378	-0.2553	-0.2565
	(0.1255)	(0.1330)*	(0.1327)*	(0.1611)***	(0.1627)***	(0.1301)*	(0.1314)*
Openness	0.0737	0.0708	0.0713	0.0714	0.0717	0.0708	0.0715
	(0.0141)***	(0.0148)***	(0.0152)***	(0.0308)*	(0.0309)*	(0.0151)***	(0.0157)***
RuleofLaw	-0.2415	0.1210	0.1063	0.1987	0.2710	0.5384	0.5992
	(1.7267)	(1.6429)	(1.6638)	(2.5061)	(2.5093)	(1.6470)	(1.6262)
FDIout	-0.0132	-0.0152	-0.0071	-0.0190	-0.0202	-0.0155	-0.0079
	(0.0054)*	(0.0055)***	(0.0450)	(0.0068)***	(0.0072)***	(0.0056)***	(0.0409)
Policy		0.6313	0.6678	0.0000	-0.0000	0.2945	0.3447
		(0.2315)***	(0.3054)*	(0.0000)	(0.0000)	(0.1854)	(0.2821)
*FDIout*Policy*			-0.0011		0.0000		-0.0013
			(0.0061)		(0.0000)		(0.0064)
Constant	61.1085	34.2222	34.0227	156.7924	157.6776	42.6449	43.1050
	(26.8414)*	(26.1870)	(26.0139)	(65.8823)*	(65.5544)*	(26.3013)	(27.1765)
R^2	0.17	0.18	0.18	0.19	0.20	0.17	0.17
Observation	437	410	410	312	312	410	410
No. of countries	37	37	37	37	37	37	37

Notes: Figures in parentheses are robust standard errors. ***, **, * indicate significance levels at 1%, 5%, 10%, respectively.

Table 6. Regression results, FDI outflows, developing countries, dependent variable: TFP growth

	(1) Basic	(2) *Policy*= *IPR*	(3) *Policy*= *IPR*	(4) *Policy*= *Patent*	(5) *Policy*= *Patent*	(6) *Policy*= *KTransfer*	(7) *Policy*= *KTransfer*
NonAgri	-0.1322	-0.1936	-0.1829	-0.0522	-0.0511	-0.1865	-0.1062
	(0.1000)	(0.1210)	(0.1240)	(0.1425)	(0.1415)	(0.1153)	(0.1189)
ln*GDPPC*	1.5370	4.3506	4.1249	-1.2116	-1.4902	4.0458	3.0751
	(2.2061)	(2.8308)	(2.6190)	(4.7124)	(4.7913)	(3.1647)	(3.1495)
ln*POP*	3.9947	1.8358	2.9967	8.8732	8.7661	2.1751	3.3603
	(5.0110)	(6.5344)	(6.2726)	(9.9467)	(10.2555)	(7.6117)	(7.3593)
Credit	-0.1178	-0.1098	-0.1049	-0.1223	-0.1166	-0.1119	-0.0965
	(0.0271)***	(0.0291)***	(0.0261)***	(0.0400)***	(0.0391)***	(0.0295)***	(0.0286)***
Inflation	-0.0838	-0.0855	-0.0854	-0.1671	-0.1578	-0.0881	-0.0945
	(0.0282)***	(0.0569)	(0.0545)	(0.0814)*	(0.0781)*	(0.0589)	(0.0593)
GOV	-0.2034	-0.2749	-0.2779	-0.3696	-0.3858	-0.2656	-0.2898
	(0.0488)***	(0.0949)***	(0.0835)***	(0.0966)***	(0.0874)***	(0.0900)***	(0.0868)***
Openness	0.0582	0.0386	0.0458	0.0969	0.0933	0.0447	0.0635
	(0.0244)*	(0.0254)	(0.0239)*	(0.0278)***	(0.0263)***	(0.0249)*	(0.0268)*
RuleofLaw	1.4915	2.2191	1.9802	1.2262	1.1207	2.6797	2.2305
	(1.2594)	(1.0315)*	(1.1700)	(1.8000)	(1.7049)	(1.0000)*	(1.1366)*
FDIout	-0.1351	-0.1434	-0.7360	-0.0711	-0.0587	-0.1268	-0.6131
	(0.0525)*	(0.0326)***	(0.2804)*	(0.0612)	(0.0662)	(0.0386)***	(0.2449)*
Policy		0.4970	0.0900	-0.0000	0.0001	-0.0089	-0.5649
		(0.4671)	(0.5070)	(0.0000)	(0.0002)	(0.5196)	(0.5928)
*FDIout*Policy*			0.0943		-0.0000		0.0862
			(0.0413)*		(0.0000)		(0.0408)*
Constant	-8.1150	-17.0188	-19.3378	-12.8559	-10.2673	-14.7729	-18.2611
	(17.2276)	(14.8282)	(15.6639)	(31.7052)	(31.4872)	(20.0683)	(19.1155)
R^2	0.36	0.30	0.31	0.29	0.29	0.29	0.31
Observation	226	194	194	162	162	194	194
No. of countries	20	20	20	20	20	20	20

Notes: Figures in parentheses are robust standard errors. ***, **, * indicate significance levels at 1%, 5%, 10%, respectively.

Table 7. Regression results, FDI inflows and outflows, all countries, dependent variable: TFP growth

	(1) Baseline	(2) *Policy= IPR*	(3) *Policy= IPR*	(4) *Policy= Patent*	(5) *Policy= Patent*	(6) *Policy= KTransfer*	(7) *Policy= KTransfer*
NonAgri	-0.1919	-0.1582	-0.1600	-0.2611	-0.2504	-0.1817	-0.1796
	(0.1010)*	(0.1138)	(0.1119)	(0.1966)	(0.1928)	(0.1132)	(0.1148)
ln*GDPPC*	-1.5105	0.0657	0.2548	-3.4588	-3.6752	-0.0027	0.0255
	(1.7057)	(1.5569)	(1.5917)	(2.2960)	(2.2626)	(1.5239)	(1.5817)
ln*POP*	2.3023	2.8042	2.3244	-1.2936	-1.3540	1.4823	1.4948
	(2.2370)	(2.9735)	(2.9610)	(2.2965)	(2.2832)	(3.0085)	(3.0902)
Credit	-0.0286	-0.0250	-0.0239	-0.0260	-0.0265	-0.0265	-0.0266
	(0.0099)***	(0.0084)***	(0.0082)***	(0.0162)	(0.0163)	(0.0084)***	(0.0081)***
Inflation	-0.1180	-0.0993	-0.1071	-0.2223	-0.2206	-0.0981	-0.0986
	(0.0340)***	(0.0607)	(0.0621)*	(0.0690)***	(0.0684)***	(0.0622)	(0.0644)
GOV	-0.1756	-0.2617	-0.2685	-0.3612	-0.3623	-0.2427	-0.2430
	(0.0610)***	(0.0838)***	(0.0804)***	(0.0986)***	(0.0989)***	(0.0784)***	(0.0779)***
Openness	0.0619	0.0524	0.0516	0.0705	0.0720	0.0531	0.0527
	(0.0120)***	(0.0121)***	(0.0122)***	(0.0226)***	(0.0226)***	(0.0121)***	(0.0125)***
RuleofLaw	-0.8539	0.1719	-0.0811	-0.0781	-0.0752	0.4529	0.4323
	(1.1049)	(0.9984)	(0.9948)	(1.6403)	(1.6315)	(1.0188)	(1.0702)
FDIin	-0.0247	-0.0214	-0.1004	-0.0250	-0.0279	-0.0195	-0.0158
	(0.0123)*	(0.0126)*	(0.0629)	(0.0163)	(0.0169)	(0.0124)	(0.0571)
FDIout	0.0109	0.0067	0.0674	0.0025	0.0022	0.0043	-0.0050
	(0.0123)	(0.0130)	(0.0504)	(0.0160)	(0.0160)	(0.0126)	(0.0465)
Policy		0.5364	0.3682	0.0000	-0.0000	0.3687	0.3479
		(0.2258)*	(0.3006)	(0.0000)	(0.0000)	(0.1905)*	(0.2655)
*FDIin*Policy*			0.0111		0.0000		-0.0007
			(0.0077)		(0.0000)*		(0.0090)
*FDIout*Policy*			-0.0085		-0.0000		0.0016
			(0.0062)		(0.0000)		(0.0072)
Constant	28.0236	5.9604	7.4545	66.1065	67.1359	13.9605	13.6249
	(13.0454)*	(10.2775)	(9.2655)	(21.9459)***	(21.8956)***	(10.0482)	(10.0817)
R^2	0.20	0.17	0.18	0.19	0.19	0.17	0.17
Observation	663	604	604	474	474	604	604

Notes: Figures in parentheses are robust standard errors. ***, **, * indicate significance levels at 1%, 5%, 10%, respectively.

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APPENDIX A: DATA APPENDIX

Country Lists

Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Lithuania, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, UAE, Ukraine, United Kingdom, USA, Venezuela.

Variable and Source

Variable	Definition and Source
TFPgrowth	Growth rate of TFP at constant national prices (2005=1). (Source: Penn World Table (PWT) 8.)
NonAgri	Share of non-agriculture sector as a percentage of GDP (Source: IMD's *World Competitiveness Yearbook*, 2013.)
GDPPC	Real GDP per capita (constant 2005 US$). (Source: World Bank's World Development Indicators (WDI).)
POP	Population (in millions). (Source: Penn World Table (PWT) 8.)
Credit	Domestic credit to private sector as a percentage of GDP. (Source: World Bank's World Development Indicators (WDI).)
Inflation	Inflation rate, consumer prices (annual %). (Source: World Bank's World Development Indicators (WDI).)
GOV	Share of government consumption as a percentage of GDP. (Source: Penn World Table (PWT) 8.)
Openness	Trade openness, measured by the sum of export and import as a percentage of GDP. (Source: World Bank's World Development Indicators (WDI).)
RuleofLaw	Rule of law indicator. (Source: Worldwide Governance Indicators (WGI).)
FDIin	FDI stock (inflow) as a percentage of GDP. (Source: UNCTAD.)
FDIout	FDI stock (outflow) as a percentage of GDP. (Source: UNCTAD.)
IPR	Intellectual property rights indicator. (Source: IMD's *World Competitiveness Yearbook*, 2013.)
PATENT	Number of patents granted to residents indicators. (Source: IMD's *World Competitiveness Yearbook*, 2013.)
KTRANSER	Knowledge transfer indicator. (Source: IMD's *World Competitiveness Yearbook*, 2013.)